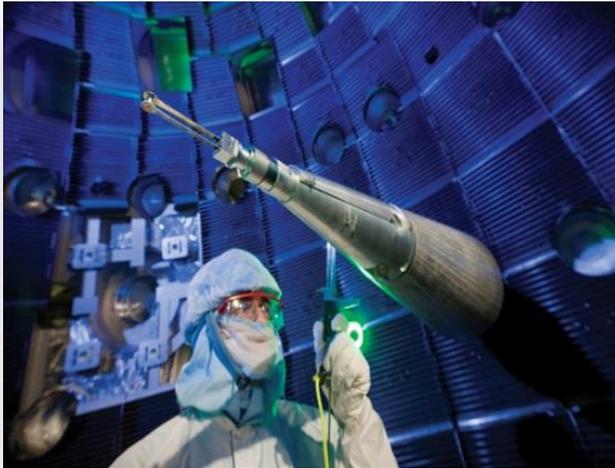




Update to the Secretary of Energy's Advisory Board





NNSA Missions & Crosscutting Capabilities



APPLYING TECHNICAL CAPABILITIES TO NATIONAL SECURITY CHALLENGES





“Maintain a safe, secure, and effective arsenal”

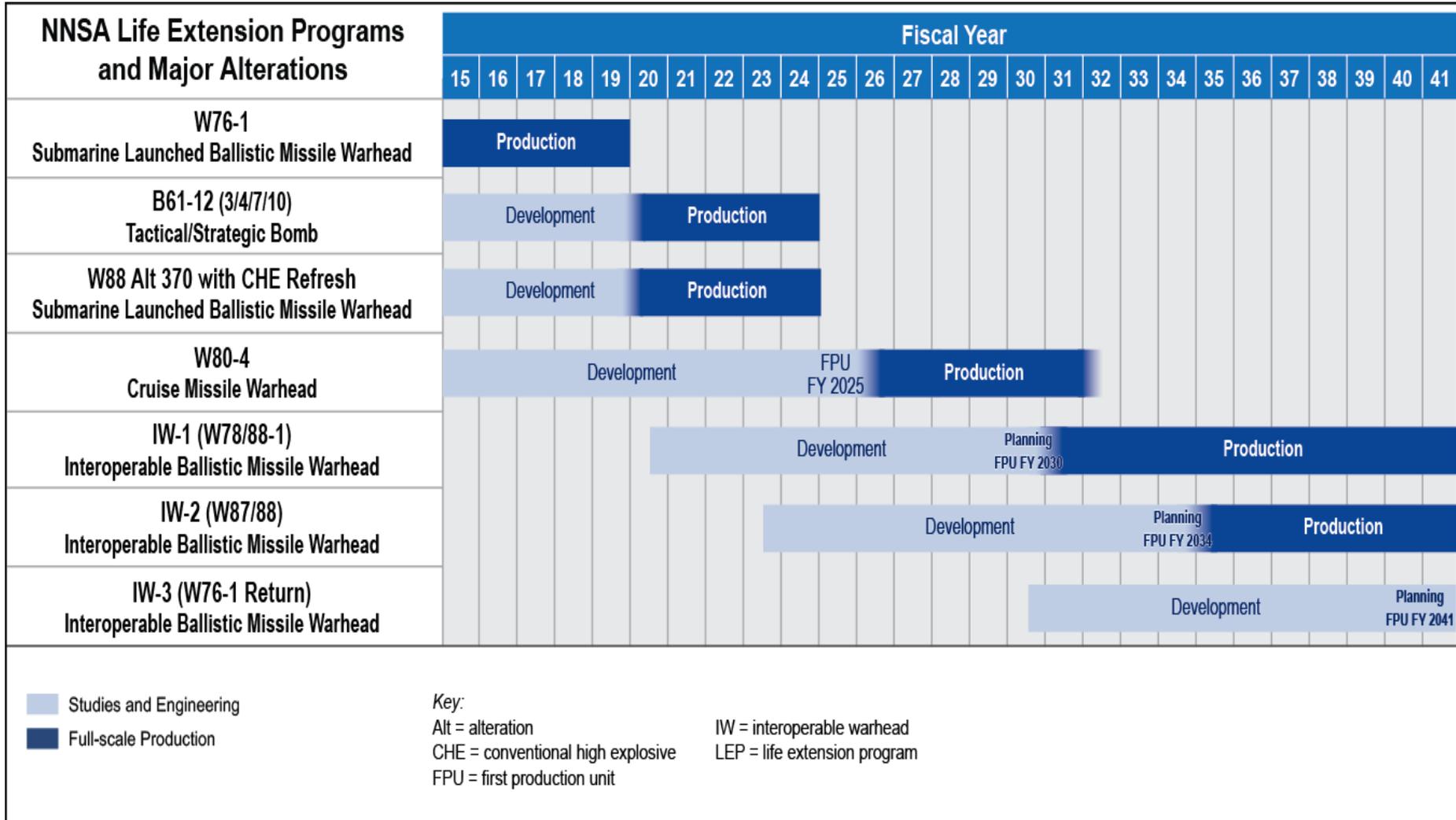


- **Perform maintenance and surveillance of the existing nuclear weapons stockpile**
- **Conduct Life Extension Programs (LEPs)**
 - Complete W76-1 Life Extension Program (LEP) no later than 2019
 - B61-12 LEP First Production Unit (FPU) in FY 2020
 - W88 Alt 370 FPU in FY 2020 (includes conventional high explosive replacement)
 - W80-4 LEP FPU in FY 2025 (cruise missile warhead)
 - Interoperable Warhead (IW-1) LEP FPU in FY 2030

Supports “3+2” Strategy to maintain a nuclear triad while reducing the number & types of weapons: 3 ballistic systems (with explosive package interoperability) and 2 air-delivered systems



Life Extension Programs

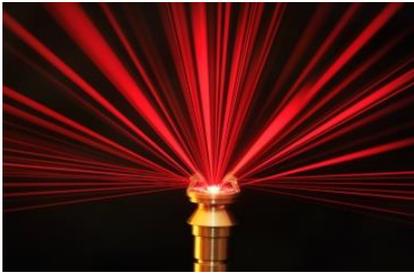




Science, Technology & Engineering



S, T & E capabilities from across the nuclear security enterprise deliver data & models that increase confidence in annual assessments and inform future LEP options



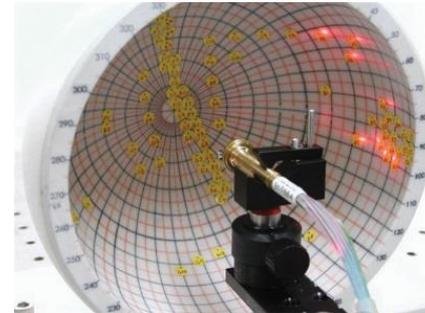
Experimentation plays a critical role in technology maturation, design & qualification of LEPs, & the nuclear survivability qualification of weapon components.



Inertial Confinement Fusion delivers high energy density physics platforms to access materials under extreme conditions



Advanced Simulation and Computing delivers high-performance computer platforms & integrated codes with models and algorithms to assess weapon systems



Engineering delivers technology solutions that enable surety, surveillance, survivability, and testing throughout the weapon lifecycle

For more than 20 years, science-based stockpile stewardship has provided the capability to sustain the nuclear weapons stockpile without nuclear explosive testing.



Infrastructure



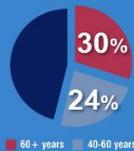
NNSA SAFETY, INFRASTRUCTURE & OPERATIONS

A VAST AND COMPLEX ENTERPRISE



THE CHALLENGE: AGING & DECLINING INFRASTRUCTURE

AGE OF FACILITIES



EXCESS FACILITIES



CONDITION OF FACILITIES



Vision

Safely operate and modernize our enterprise to meet demands now and in the future.

Mission

Maintain, Operate, and Modernize NNSA Infrastructure in a safe, secure, and cost-effective manner to enable program results.

41,000

LABORATORY & PLANT EMPLOYEES

2,000 miles of roads

NEARLY THE DRIVING DISTANCE FROM DC TO LOS ALAMOS

TRACK 400,000 METRIC TONS OF NUCLEAR MATERIAL TRANSACTIONS



safety for 400 nuclear facilities



2,160 square miles of land area

ABOUT THE SIZE OF DELAWARE

36 Million SQUARE FEET OF FACILITY SPACE



(~ six Pentagons worth)

15.2 MILLION FT³ OF HAZMAT

ENOUGH TO FILL ~15 WASHINGTON MONUMENTS



9.1 Trillion BTUs ANNUAL ENERGY CONSUMPTION



enough to power ~250,000 homes for one year

As of the end of FY 2015, NNSA's total deferred maintenance stood at \$3.7 billion



Kansas City National Security Campus



New facility cut NNSA's footprint in Kansas City from 3 million to 1.5 million square feet and reduced operating and maintenance costs by \$100 million per year.



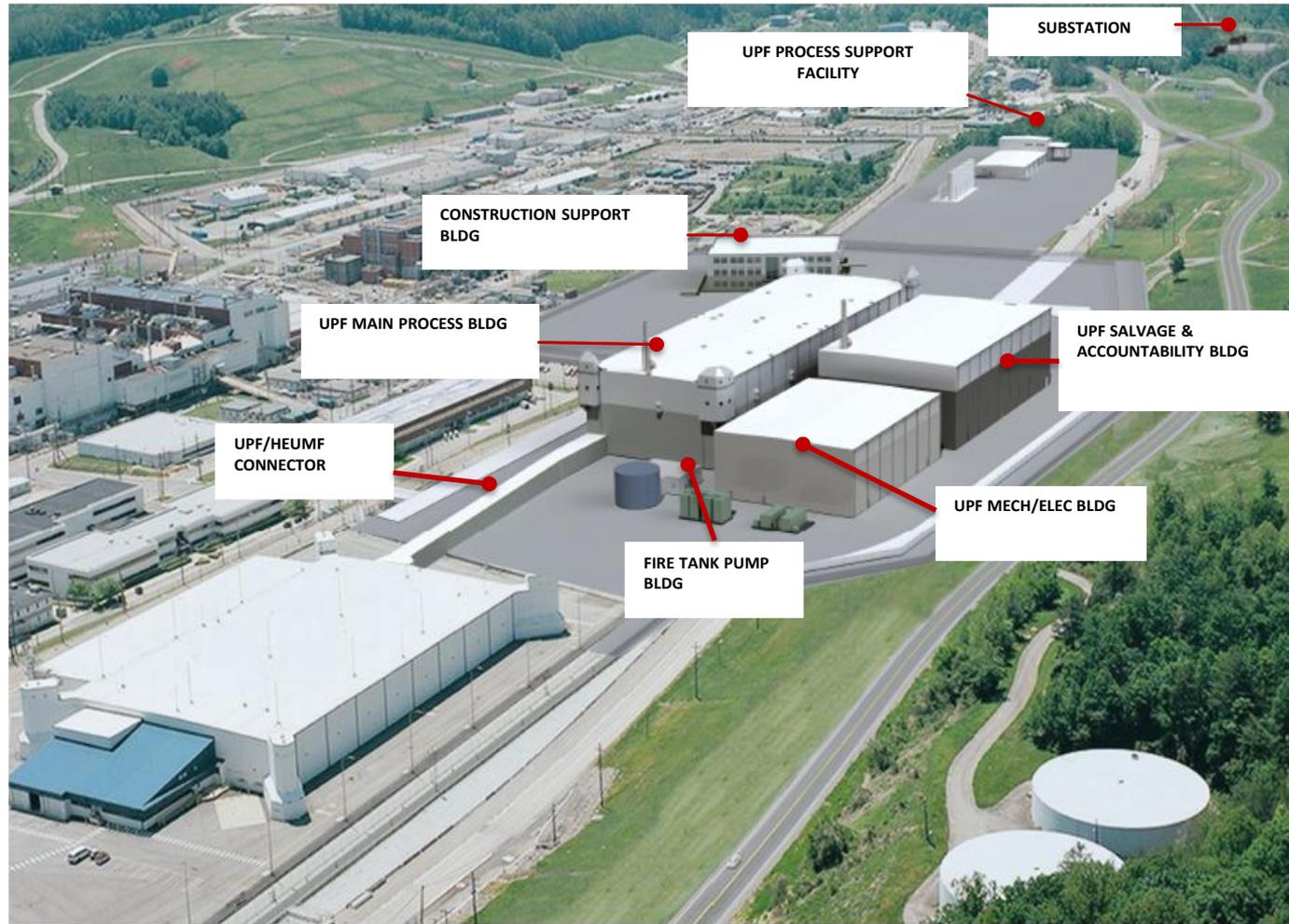
Pantex Administrative Support Complex



New facility will allow roughly 1,000 employees to move out of 1950s-era buildings into a modern, energy efficient workspace and eliminate roughly \$20 million in deferred maintenance at Pantex.



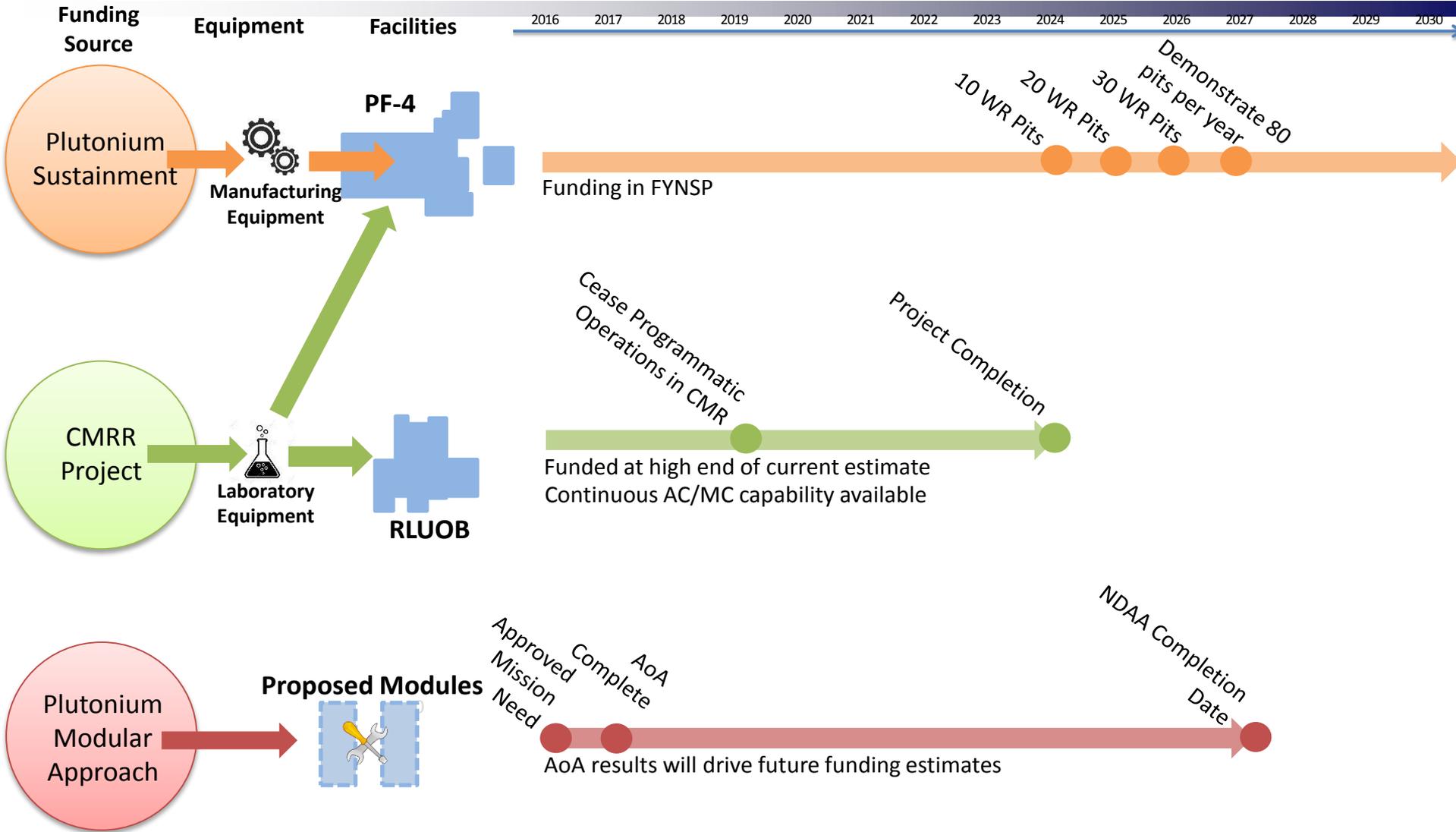
Uranium Processing Facility



UPF supports ceasing enriched uranium programmatic operations in 9212 by 2025



Plutonium Strategy





“Cut off the building blocks needed for a bomb”



Nuclear Security Summit Process

- Responsible for delivering on U.S. commitments & NSS gift baskets
- Supported diplomatic push for ratification of an Amended CPPNM
- Support to growing network of Centers of Excellence – China, Japan, ROK, Kazakhstan
- *Apex Gold*



Joint Comprehensive Plan of Action

- Provided technical advice and options to policy makers & negotiators
- Developed tools for enhanced capabilities to monitor compliance
- Collaborating to redesign Arak reactor



Prevent · Counter · Respond



“Secure all vulnerable nuclear materials”



Remove/Eliminate Nuclear Material

- Since Prague, 16 countries + Taiwan have removed or confirmed the disposition of all HEU from their territory in that same period
- Downblended/eliminated 153.5 MT of HEU excess to U.S. defense needs
- HEU & Pu removal from Japan Fast Critical Assembly

Minimize HEU in Civil Applications

- 34 research reactors and isotope production facilities in 18 countries converted or shutdown verified since 2009
 - China now converting its MNSR reactors in Nigeria, Ghana, and others
- Accelerating conversion of medical isotope production facilities to LEU targets in South Africa, Belgium, and the Netherlands
- Cooperative agreements with U.S. companies to develop non-HEU Mo-99 production technologies





“Secure all vulnerable nuclear materials”



Counter Nuclear Smuggling

- Detection equipment provided to more than 36 countries since 2009
- Expanding international cooperation to build nuclear forensics capabilities



Radiological Security

- Protected over 1,400 buildings since 2009 (domestic & int'l)
- Recovered more than 19 million curies of radiological material worldwide since 2009
- Supporting development of alternate technologies



Support Emergency Response

- Developing U.S. All-Hazards Emergency Response Enterprise
- Designing exercises in collaboration with nonproliferation programs
- Conducting aerial radiation surveys in U.S. and build international capacity to do the same
- Providing international emergency response training and capacity building



Prevent · Counter · Respond



“Pursue U.S. Ratification of the CTBT”



International Monitoring System

- Upgraded capabilities at PNNL radionuclide laboratory
- Regional Seismic Travel Time model
- Source Physics Experiments

On-site Inspection

- Played major role in preparation & execution of 2014 Integrated Field Exercise (IFE) in Jordan (>\$1m in equipment provided to CTBTO)
- Hosted 50 OSI experts from 32 countries in familiarization visit to NNSA (May 2016)
 - Leading to 2017 expanded OSI training at NNSA

International Data Center

- IDC re-engineering
- Director is a U.S. national (from NNSA)





“Build a New Framework for Civil Nuclear Cooperation”



U.S. Agreements for Civil Nuclear Cooperation (aka 123 Agreements)

- DOE/NNSA supports negotiation and implementation
 - 22 Agreements in force with 49 partners (including Member States of Euratom)
- 2009-present
 - China, Republic of Korea, IAEA, Taiwan, Vietnam (new), Russia
 - Renewed U.S.-Norway 123 Agreement is currently pending Congressional Review
 - Currently supporting ongoing negotiations with Mexico, Jordan, Saudi Arabia

International Nuclear Fuel Bank

- Contributed \$50M for establishment of fuel bank in Kazakhstan

Export Controls

- International capacity building
- Part 810 revision and Performance Improvement Plan – increase efficiency while preserving high nonproliferation standards

Peaceful Uses Initiative

- U.S. initiative through IAEA to support peaceful uses – DOE focus on nuclear newcomer countries (e.g. radiological source management)

Prevent · Counter · Respond